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Face Yourself(ie): Investigating selfie-behavior in females with severe eating disorder symptoms

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ABSTRACT

Introduction: With the rise of camera phones, selfie-taking has become a normative part of our modern culture. However, little is known about how this behavior may relate to eating disorder (ED) characteristics, particularly in those who already have eating disorder symptoms of clinical severity. The current study investigated how selfie-posting and selfie-taking with no intention of posting online (offline selfies) were related to ED symptoms.
Method: A total of 152 females (average age 22.44 years) with ED symptoms of clinical severity completed self-report questionnaires measuring selfie-frequency (online and offline), frequency of non-selfie photo posting, social networking site use, body dissatisfaction, body checking, ED symptom severity, self-esteem and body avoidance. Responses were collected via an ED social community.
Results: No direct relationship, or indirect association via body dissatisfaction, was found between selfie behavior and ED symptom severity. However, the more offline selfies an individual took, the more frequently they body checked, and this, in turn, was related to greater ED symptom severity.
Conclusions: These results suggest that offline selfies may be a modern form of body checking. Our findings are the first to imply that offline selfie-taking may be a problematic behavior and a potential maintenance factor for individuals with severe ED symptoms.

As newcomers to the media landscape, social networking sites (SNS) have introduced new forms of self-expression and communication to our online world. On communication platforms like SNS, creating personal profiles and interacting with others is facilitated by online functions such as public status updates, private messaging, photo sharing, and group pages. Engaging on SNS has become a popular pass-time with approximately 90% of young adults in the US using an SNS account (Perrin et al., 2015). More recent numbers showed that in 2018 more than 95% of the Dutch individuals between 18 and 35 was active on Internet (e.g. social media; Central Bureau for Statistics, 2019). Several studies have found that those who spend more time on SNS also reported more body image concerns (for a review see: Holland & Tiggemann, 2016; Marengo, Longobardi, Fabris, & Settanni, 2018). Focusing on photo-related activity (e.g., posting and commenting on photos), adolescent girls who were more engaged with photos on SNS also reported higher levels of body image disturbance (Meier & Gray, 2014). Similarly, frequent use of 'highly visible' social media, such as Instagram and Snapchat which are image based platforms, has been associated with increased body image concerns (Marengo et al., 2018).This suggests that engaging with image content on social media may be problematic for maintaining a healthy body image. Selfie posting has become a popular activity on SNS, especially amongst young adults, with females being the primary subject of selfies around the world (Souza et al., 2015; Tiggemann & Slater, 2013). We propose that the word 'selfie' has expanded its roots in social media and is now used, in general terms, as word to describe self-images taken by oneself. This is further validated by the definition as posed in the Cambridge Dictionary, describing a selfie as 'a photograph that you take yourself, usually with a mobile phone. Selfies are often published using social media'(Cambridge Dictionary, 2019). When posted online, selfies are favored over other photos, receiving up to 3.2 times more 'likes' on social media (Souza et al., 2015). They are also the most popular category of images uploaded to SNS (Hu, Manikonda, & Kambhampati, 2014). Despite the ubiquity of selfies, literature investigating the impact of selfie-behavior on psychological health is in its infancy.

Most studies investigating selfie-behaviors have reported on posting motives, and on associations between selfie-posting and personality traits such as narcissism and psychopathy. Overall, levels of narcissism

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and subclinical psychopathy are positively associated with frequency of selfie-posting (Fox & Rooney,2015; Sorokowska et al., 2016; Sorokowski et al., 2015; Sung, Lee, Kim, & Choi, 2016; Weiser, 2015). Another line of research has focused on the associations between selfie-behaviors and body image. An experimental study by Mills, Musto, William, and Tiggemann (2018) examined state feelings about one's body after young women either took a selfie and posted it social media or read a neutral news article online. They found those who posted a selfie felt less physically attractive after posting the photo; a finding not observed in the control group. This suggests taking and posting selfies can be directly linked to experiencing poor body image. Furthermore, McLean, Paxton, Wertheim, and Masters (2015) found that female adolescents who post selfies were more likely to have internalized the thin-ideal, to be dissatisfied with their body, and to place significance on weight and shape. Furthermore, the more individuals invested in and manipulated selfies, the more they reported dietary restraint alongside thin-ideal-internalization, body dissatisfaction, and overvaluation of weight and shape (Cohen, Newton-John, & Slater, 2018; McLean et al., 2015).

An alternative explanation may be that those with higher levels of body image concern may be attracted to appearance-focused activities on social media (McLean et al., 2015; Veldhuis, Alleva, Bij de Vaate, Keijer, & Konijn, 2018). One study found that trait levels of self-objectification predicted how many selfies women posted to their Instagram account and that images rated as higher in self-objectivation received significantly more positive feedback ("likes"; Bell, Cassarly, & Dunabr, 2018). This is in accordance with work by Perloff (2014), suggesting that those with greater body image and eating concerns may seek appearance related gratification through social media attention. Similarly, Veldhuis et al. (2018) suggested that body image may not only serve as an outcome of selfie-behaviors, but also as a motive preceding selfie-behaviors. Goffman's theory of self-presentation (1959) presents another relevant viewpoint from which to view social media. This theory states that people use social interactions to manage others impressions and also present positive attributes to facilitate favorable impressions. It has been suggested, in line with Goffman's theory, that selfies posted on SNS are a form of impression management where the 'ideal self' can take center stage (Ma, Yang, & Wilson, 2017; McLean et al., 2015; Bij de Vaate, Veldhuis, Alleva, Konijn, & van Hugten, 2018). Using social media to present the ideal self has also been documented in other research interviewing young females (Pounders, Kowalczyk, & Stowers, 2016). In all, from the aforementioned studies, it is likely that the relationship between SNS use and selfie-behaviors on the one hand, and body image and self-image concepts on the other, is working two ways, indicating that they might be reciprocal in causality (also suggested in Veldhuis et al., 2018). Since we focus on a novel target group, being women experiencing severe ED symptoms, we take a cross-sectional approach in a first attempt to explore their situation when it comes to selfies.

To our knowledge, a study investigating selfie-behavior in individuals with clinically severe eating disorder (ED) symptoms has never been attempted. One might expect that the more individuals with clinically severe ED symptoms expose themselves to their own image through selfie-taking, the more body dissatisfaction may be experienced. We argue that the impact of taking offline selfies (i.e., self-images with no intention of posting these online on those with ED symptoms should be considered as well.

According to communication theorizing, constant exposure to idealized media images leads to the internalization of such imagery as being perceptions of social reality (cf. Cultivation Theory; Gerbner & Gross, 1976; Gerbner, Gross, Morgan, Signorielli, & Shanahan, 2002). Applying this cultivation principle to the topic of appearance and body image, especially young girls and women seem prone to internalize ideal-body portrayals, leading to the acceptance of such bodies as sociocultural standards (e.g., Barlett, Vowels, & Saucier, 2008). Previous meta-analyses and reviews have repeatedly indicated the negative impact of ideal-body exposure, for example, in terms of increased body dissatisfaction (e.g., Barlett et al., 2008; López-Guimèra, Levine, Sánchez-Carracedo, & Fauquet, 2010), while studies also indicated that idealized body imagery can contribute to the onset of eating disorders (Spettigue & Henderson, 2004). Connecting more specifically to selfies, we know that the process of selfie-behavior starts with taking selfies, and that from there a selection is made in these selfies taken for those to be eventually published online (frequently preceded by applying editing techniques such as filters; see Bij de Vaate et al., 2018). However, although people do indicate that they take selfies now and then, not all people seem to actively engage in posting their selfies online (cf. Cohen et al., 2018). Yet, given the focus on appearance in selfies, we argue that individuals can use selfies to check their own appearance without the motivation to post the image publicly on social media. By focusing exclusively on the self, a state of objective self-awareness can be activated (Duval & Wicklund, 1972). Automatic comparisons between oneself and the standards that someone aims to comply to can be triggered. This often results in negative feelings about one's appearance as one cannot comply to that standard. Thus, offline-selfie-taking may be positively associated with body dissatisfaction for the same reasons as online-selfie-posting. That is, although the motive to present the ideal self is likely weaker (due the potential for only the taker to see the photo), taking selfies may still lead to scrutiny of how one looks in each image. This may trigger similar negative thought processes and negative relations with body dissatisfaction as experienced in mirror exposure (Wilhelm, Hartmann, Cordes, Waldorf, & Vocks, 2018).

It could also be proposed that offline-selfie-taking may operate as a modern type of body checking where an individual not only compares their image with sociocultural standards but with previous images of themselves. Documented body checking behaviors are pinching the stomach and thighs, measuring the thigh gap, ritualistic weighing, and visual assessment of the body in different positions (Reas, Whisenhunt, Netemeyer, & Williamson, 2002). These behaviors provide feelings of control (Shafran, Fairburn, Robinson, & Lask, 2004) and relieves anxiety in the short-term (Reas & Grilo, 2004). In the long-term, however, body checking magnifies pre-occupation with weight and shape (Shafran et al., 2004; Shafran, Lee, Payne, & Fairburn, 2007), and thus is also associated with greater ED symptomatology (Shafran et al., 2004).

To conclude from the above reasoning, the present study's overall aim was to investigate the association between selfie-behaviors (both online and offline) and ED symptom severity in a sample of females with clinically severe ED symptoms. More specifically, first, we hypothesized an indirect relation between online selfie-posting and ED symptom severity via body dissatisfaction (H1). Secondly, we hypothesized an indirect association between offline selfie-taking and ED symptom severity via both body dissatisfaction and body checking (H2).

1. Method

1.1. Participants

We collected 229 complete survey responses from female visitors of a large e-community for individuals with eating problems or disorders that is dedicated to promoting a healthy body image and approach to eating and exercise. Only participants above the age of sixteen-years-old were allowed to participate. After applying a clinical cut off score of 2.5 or greater (cf. Rø, Reas, & Stedal, 2015) to the mean global scores for ED symptom severity (EDE-Q 6.0; Fairburn & Beglin, 2008), our sample consisted of 184 females. Then, individuals who did not take selfies were excluded from further analyses to create our final sample of 152 selfie-takers.

1.2. Procedure

Following approval from the University Ethics Committee, access to the survey was provided via a blog link on the e-community website. We advertised the study as a survey related to SNS engagement. The survey ran for three weeks from May 2017 to June 2017. Following study information and consent, participants were asked to fill out six questionnaires. At the end of the survey, participants were offered the chance to win one of ten bol.com vouchers of 10 Euros as an incentive. Email addresses were the only identifying information collected. These addresses were removed from the dataset in the first step of the analyses and kept confidential in a separate file on a secure server. These addresses were only used to contact winners at the end of the study.

1.3. Measures

SNS use and selfie-behavior. Participants were asked if they owned an SNS account ('yes'/'no'). If yes, they were asked how much time on average they spend daily on Facebook, Twitter, Instagram, Pinterest and Tumblr (in minutes) to create a sum score of daily SNS use (Bij de Vaate et al., 2018). Two open-ended items recorded how many selfies respondents had posted on SNS in the last week and how many selfies they had taken without the intention to post them online in the last week (so-called 'offline selfies'; this item was adapted from Fox and Rooney (2015) to allow comparisons between the amount of online and offline self-images. The number of non-selfie photos posted on SNS in the last week was also requested. Finally, the types of offline selfies were specified (i.e., face only, waist or more, whole body, face only with friends, waist or more with friends, whole body with friends taken with selfie-stick; Bij de Vaate et al., 2018).

Eating disorder symptom severity. The Eating Disorder Examination Questionnaire (EDE-Q 6.0: Fairburn & Beglin, 2008; see also Aardoom, Dingemans, Slof Op 't Landt, and van Furth, 2012, and Berg, Peterson, Frazier, & Crow, 2011) assessed ED symptomatology over the past 28 days. This measure considered both core eating disorder behaviors (6 items) and psychological features (22 items). Items assessing the psychological features used a 7-point Likert-scale ranging from 0 to 6. A global score of eating psychopathology is obtained by averaging the 22 items relating to psychological features, with higher scores reflecting more severe ED psychopathology. Internal consistency was high for the EDE-Q global score ($\alpha = 0.88$).

Body Mass Index. BMI (weight/height^2) was based on self-reported weight (in kilograms) and height (in meters).

Body dissatisfaction. The nine-item Body Dissatisfaction subscale of the Eating Disorder Inventory-II (EDI-II; Garner, Olmstead, & Polivy, 1983; van Strien, 2002) assessed how dissatisfied participants were with their body (6-point Likert-scale ranging from 0 'always' to 5 'never'; e.g. 'I am satisfied with the shape of my body'). All items were summed with higher scores reflecting greater levels of dissatisfaction (ranging from 0 to 45). Internal consistency was high ($\alpha = 0.87$).

Body checking. The 23-item Body Checking Questionnaire (BCQ; Reas et al., 2002) assessed the frequency of body checking behaviors. The questionnaire comprised 3 subscales: Specific Body Areas, Overall Appearance, and Idiosyncratic Checking (e.g. 'I pinch my stomach to measure fatness'; 5-point Likert-scale from 1 'never' to 5 'very often'). Subscales were summed to create composite body checking scores. Composite scores ranged from 23 to 115 with higher scores reflecting greater incidence of body checking behaviors. The BCQ had a high internal consistency ($\alpha = 0.93$).

Body avoidance. The 16-items Body Image Avoidance Questionnaire (BIAQ: Rosen, Srebnik, Saltzberg, & Wendt, 1991) was used to measure avoidance of body image. Items were related to clothing, social activities and grooming (e.g. 'I wear clothes that will divert attention from my weight'; 5-point Likert-scale from 1 'always' to 5 'never'). Items were summed to create a composite body image avoidance score ranging from 15 to 75. Greater scores reflect greater body image avoidance. Internal reliability of the measure was good ($\alpha = 0.71$).

Self-esteem. Rosenberg's ten-item Self-Esteem Scale (RSE: Rosenberg, 1965) was used to measure an individual's beliefs about their own self-worth (e.g. 'I feel that I am a person of worth, at least on an equal plane with others'; 4-point Likert-scale from 1 'strongly disagree' to 4 'strongly agree'). Scores were summed to create composite self-esteem (range 10–40). Higher scores reflect higher levels of self-esteem and the scale showed high internal constancy ($\alpha = 0.88$).

1.4. Data analysis

Data normality checks were performed on all variables of interest. Frequency of selfie-posting, offline selfies taken, other photos posted, average daily SNS use, body dissatisfaction and EDE-Q total score were not normally distributed. Pearson's correlations were computed with bootstrapping (1000 samples) to examine the associations between all study variables. Subsequently, to test our hypotheses, the proposed indirect effects were analyzed by applying mediation analyses using Hayes' PROCESS macro (2013), bootstrapping (5000 samples) and a 95% BCa confidence interval. This method provides bootstrapping of the direct and indirect effects which means that the sampling distribution does not need to be normal. The Hayes' PROCESS macro also allows for a multiple mediator model which we employed in H2. This has the advantage of controlling for the other mediator within the model and reducing the risk of Type 1 error with less inferential tests.

In H1 we included the covariates self-esteem, body avoidance, BMI, non-selfie posting frequency and daily SNS use. As self-esteem and body dissatisfaction are inversely related (Tiggemann, 2005), yet distinct constructs, we did not want self-esteem to confound our results relating to body dissatisfaction. Body avoidance is common in those with body image concerns (Shafran et al., 2004) and it is likely to be negatively related to selfie-taking (online and offline). A positive association has been found between body avoidance and ED symptoms (Shafran et al., 2004) and so this was also accounted for. In order to ensure our results were due to selfie-posting and not photo-posting in general or time spent on SNS, the number of non-selfie photos posted was also included alongside daily SNS use. Furthermore, in H2 we included self-esteem, body avoidance and BMI for the same reasons as H1.

In total, seven participants were excluded from H1 and two participants from H2. Two participants were excluded from SNS use descriptive statistics, correlations and the first analysis (H1) regarding selfie-posting due to reporting an impossible number of daily SNS hours. A further three participants were excluded from SNS use descriptive statistics, correlational analysis and the first analysis (H1) due to not having a SNS account and therefore lacking a daily SNS score. As a result of these exclusions for the correlational analysis we report data from 147 participants for online selfie posting, other photo posting and SNS use. Two more were excluded from H1 and H2 due to missing BMI data (a covariate in the analysis).

2. Results

2.1. Demographic and clinical characteristics

Participants' mean age was 22.44 years ($SD = 5.45$; range 16–46 years-old). Native Dutch participants made up 95.4% of the sample. SNS-accounts were used daily by 98% of participants with an average SNS use per day of 2.52 h ($SD = 2.34$ h). In terms of the time spent per day, Facebook was the most popular SNS followed by Instagram (see Table 1). Of the 152 selfie-takers, 44.7% posted selfies to social media in the past week, and 62.5% had taken offline selfies in the past week. The average number of selfies posted in the last week was 4.27 ($SD = 0.88$) compared to an average of 43.97 for offline selfies ($SD = 7.42$). Nearly all participants who took offline selfies took face-only selfies (93.7%). Around sixty-three percent (63.2%) took selfies

Table 1
Descriptive statistics on social networking site (SNS) Usage (n = 147).

Descriptives	Facebook	Instagram	SnapChat	Pinterest	Twitter
Participants with an active SNS-account (%)	91.8%	91.8%	74.8%	71.4%	52.4%
Average amount of time spent per day (in minutes; *M*, *SD*)	55.7 (74.4)	55.2 (77.9)	19.3 (36.8)	13.3 (25.9)	7.8 (25.9)

Table 2
Means and standard deviations for all clinical variables (N = 152).

Variable	*M*	*SD*
EDE-Q global score	4.27	0.88
Frequency objective binge episodes, past 28 days	5.09	15.06
Frequency excessive exercising, past 28 days	11.20	11.79
Frequency self-induced vomiting, past 28 days	4.81	17.05
Frequency laxative misuse, past 28 days	1.21	4.85
Body dissatisfaction (EDI-II subscale)	18.66	6.10
Body checking (BCQ)	73.31	18.15
Self-esteem (RSE)	18.53	4.74
Body avoidance (BIAQ)	43.97	7.42

Note. EDE-Q = Eating Disorder Examination-Questionnaire; EDI-II = Eating Disorder Inventory-II; BCQ = Body Checking Questionnaire; RSE = Rosenberg Self-Esteem, BIAQ = Body Image Avoidance Questionnaire.

including their waist and body above, and 62.1% with their whole body visible. Moreover, our participants preferably appeared alone in their selfies compared to taking selfies with others (56.8% face-only with friends, 43.2% waist up with friends and 15.8% whole body visible with friends using selfie stick).

The BMI for the sample ranged from 12.43 to 46.31 with an average of 20.24 (SD = 4.61). Two percent of the sample reported experiencing an eating problem for over 20 years, while the responses of the remaining 98% ranged from less than 1 month to 18 years (M = 94.65 months [~ 7 years, 10 months], SD = 102.83 months [~ 8 years, 6 months]). Means and standard deviations for all clinical variables can be found in Table 2.

2.2. Correlational relationships

Results of the preliminary Pearson's correlation analysis used to assess the relationships among all study variables can be observed in Table 3. Highlighting some of the most relevant findings, we found that females reporting higher levels of SNS use also scored higher on ED symptom severity. Selfie-posting was not significantly correlated with ED symptom severity or body dissatisfaction. However, females who engaged in offline selfie-taking to a greater extent, also showed increased ED symptom severity and body checking behaviors. Furthermore, frequency of offline-selfie taking was unrelated to body dissatisfaction. Finally, selfie-posting and offline-selfie-taking did not correlate.

2.3. Online selfie-posting and ED symptom severity via body dissatisfaction

Regarding H1, we tested whether the relation between selfie-posting and ED symptom severity was mediated by body dissatisfaction (n = 145; see also visualization in Fig. 1). Our results indicated that online selfie-posting was unrelated to both ED symptom severity and body dissatisfaction.

Firstly, the total direct relationship between selfie-posting and ED symptoms was not significant, $b = -.01$, $t(138) = -0.47$, $p = .62$, bootstrapped CI [-0.03 − 0.02]. Furthermore, looking at the indirect relationship, the association between selfie-posting and body dissatisfaction was not significant; $b = .10$, $t(138) = 1.10$, $p = .28$, bootstrapped CI [-0.07 − 0.27]. Therefore, those who posted more selfies did not report experiencing more body dissatisfaction as we had expected.

As the first step of the indirect relationship was not significant, this means the proposed mediational pathway cannot be significant, and so we did not report further on the significance of covariates. The empirical data did not support H1: Selfie-posting was not significantly related to ED symptom severity, and this was the case neither in a direct relationship, or indirectly through body dissatisfaction.

2.4. Offline selfie-taking and ED symptom severity via body dissatisfaction and body checking

For H2, we tested the indirect effect between offline selfie-taking (with no intention to post online) and ED symptoms via body dissatisfaction and body checking (N = 150). We found that body checking (bootstrapped CI [0.001 − 0.007] of indirect effect) but not body dissatisfaction (bootstrapped CI [-0.004 − 0.001] of indirect effect) was a significant mediator in this model (see Fig. 2).

Although the results showed that the total direct relationship between offline selfie-taking and ED symptoms was not significant ($b = -.002$, $t(145) = 0.88$, $p = .38$, bootstrapped CI [-0.002 − 0.006]) after controlling for self-esteem ($b = -0.04$, $p = .01$), body avoidance ($b = 0.05$, $p < .001$), and BMI ($b = 0.02$, $p = .09$) there was a significant indirect mediational pathway observed between offline selfie-

Table 3
Correlations among all study variables.

Variable	ED symptoms	Selfie-posting	Non-selfie-posting	SNS use	Offline selfies	Body dissatisfaction	Body checking	Age	Self-esteem	Bodily avoidance
ED symptoms	~									
Selfie posting	-.07	~								
Non-selfie -posting	.13	.28**	~							
SNS use	.22**	.03	.13	~						
Offline selfies	.17*	.05	.02	.05	~					
Body dissatisfaction	.60**	.04	.12	.22**	.07	~				
Body checking	.66**	.09	.23**	.20*	.28**	.46**	~			
Age	-.02	-.12	-.10	-.04	-.05	.02	-.21**	~		
Self-Esteem	-.38**	.08	-.09	-.11	-.03	-.38**	-.32**	.27**	~	
Bodily avoidance	.57**	-.10	.04	.03	.22**	.42**	.48**	-.10	-.46**	~

Note. $p < .05^{*}$, $p < .01^{**}$, N = 152 for eating disorder (ED) symptoms, Offline-selfie-taking (without any intention to post online), Body dissatisfaction, Body checking, Age, Self-Esteem and Bodily Avoidance. n = 147 for Selfie posting, Non-selfie-posting and SNS use. n = 149 for correlation between Offline-selfie-taking and SNS use only.

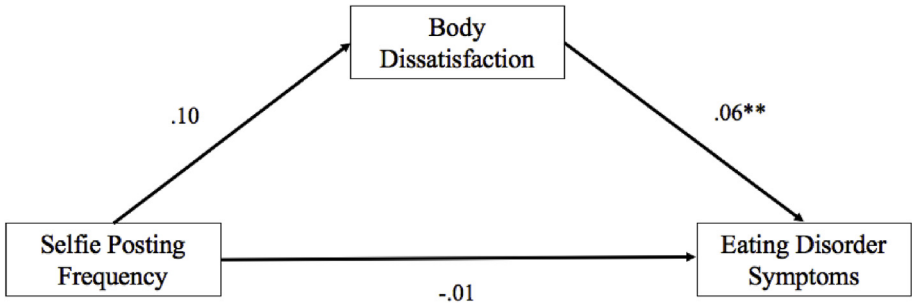

Fig. 1. Model of the relationship between selfie posting and eating disorder symptoms via body dissatisfaction. Note. All numbers represent unstandardized beta weights. $^{*}p < .05$, $^{**}p < .01$.

taking and ED symptoms via body checking.

Representing the first step in this indirect pathway, there was a significant relationship between offline selfie-taking and body checking ($b = .13$, $t(145) = 2.58$, $p = .01$, bootstrapped CI [0.03 − 0.22]). Therefore, those who took more offline selfies reported more body checking behaviors. Body avoidance was a significant covariate in this relationship ($b = 0.90, p < .001$) but self-esteem ($b = -0.56, p = .07$) and BMI were not ($b = 0.08$, $p = .77$). Then completing this indirect pathway there was also a significant relationship between body checking and ED symptoms (b = -0.001, $t(145) = -0.04$, $p < .97$, bootstrapped CI [-0.03 − 0.03]). Therefore, those who reported more body checking behaviors were found to have greater ED symptom severity. Body avoidance was also a significant covariate in this relationship ($b = 0.03$, $p = .001$) but self-esteem ($b = -0.01$, $p = .53$) and BMI ($b = 0.01$, $p = .54$) were not.

To conclude, H2 was partially supported: the relationship between offline selfie-taking and ED symptom severity occurs through an indirect mediational relationship with body checking, but not via body dissatisfaction.

3. Discussion

The present study aimed to investigate the potential relationship between selfie-behavior (both online and offline) and ED symptom severity in a sample of females with clinically severe ED symptoms. We found that both the frequency of selfie-posting and the frequency of offline selfie taking were unrelated to ED symptoms via body dissatisfaction. However, the more offline selfies individuals took, the more body checking behaviors they reported which, in turn, was associated with more severe ED symptoms. We will subsequently discuss each of these findings in greater detail.

First, contrary to our expectations no relationship was found between selfie-posting, body dissatisfaction and severity of ED symptoms in our sample of women with severe ED symptoms. This is in contrast with previous work that did find an association between frequency of selfie posting and feelings of body dissatisfaction in a general population (Cohen et al., 2018; McLean et al., 2015). However, in line with other studies, a positive relationship was found between SNS-use and ED symptomatology (Holland & Tiggemann, 2016). Our finding might be explained by the fact that the number of selfies posted is only the final part of the selfie posting process. As argued by Bij de Vaate et al. (2018), the steps in the process before actual online posting, such as selfie-selection and selfie-editing, may be where the real conscious critical observation occurs. Thus, there could be great unknown variability in how much one is exposed to one's image in the process of taking and posting a selfie that is not captured by a single measure of frequency. The findings of the present study for body checking through (offline) selfie-taking further underscore this line of argumentation.

In line with our hypothesis, our results indicated that body checking may be a pathway by which offline selfie-taking is related to ED symptoms. This indirect relationship suggests that taking offline selfies is a new method of body checking in this group. Body checking can take many forms, such as pinching flesh, measuring the waist or thigh gap or weighing and comparing the fit of the same clothes (Reas et al., 2002). We found that as offline selfie-taking increases so do these body checking behaviors, which have been shown to be play an important role in maintaining ED psychopathology (Reas et al., 2002). Therefore, offline selfie-taking may contribute to the impact of other body

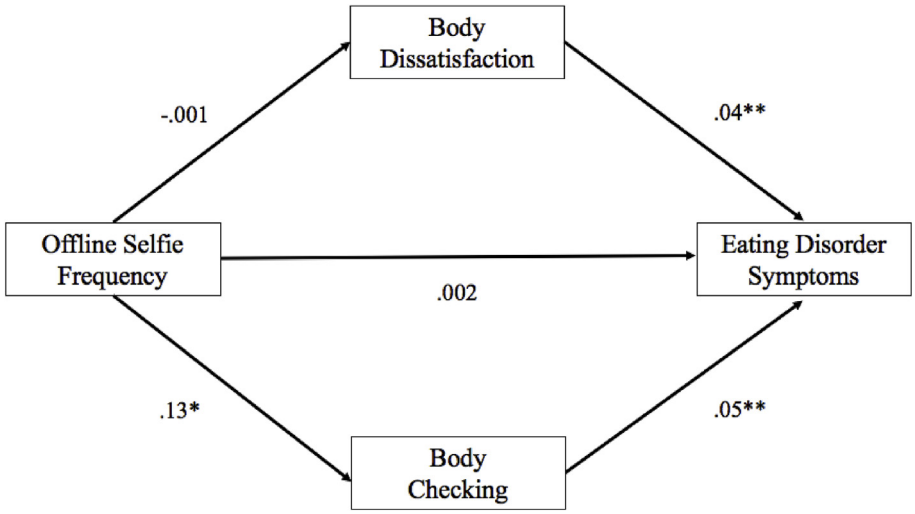

Fig. 2. Model for the relationship between Offline Selfie-taking and Eating Disorder Symptom Severity via Body Dissatisfaction and Body Checking. Note: All numbers are unstandardized beta weights. $^{*}p < .05$, $^{**}p < .01$.

checking behaviors by serving the same function. We propose that by taking selfies one could create a photographic record of what one's body looks like. Just as one may compare their waist size to previous measurements (Reas et al., 2002), previous selfies could be scrutinized for weight changes.

Further support for offline selfie-taking as a body checking behavior is observed in the clear preference in our group for selfies in which the taker was alone in the photograph compared to taking selfies with others. This preference for offline selfies without others provides some further support for the idea that these selfies may function as another private form of body checking. Despite facial selfies being the most popular, cues to weight can be observed from the face (Coetzee, Chen, Perrett, & Stephen, 2010) and so these images may still be useful for weight checking purposes. Alternatively, body checking may not be the only function for offline selfies. Other qualitative work has noted that some young women may take offline selfies as reminders of a time when they looked 'good'. These selfies would be referred to in the future to bolster self-esteem, rather than as a body checking tool (Warfield, 2014).

Furthermore, contrary to our expectations we did not find that taking more offline selfies was related to experiencing more body dissatisfaction. An explanation may be that the selfie-related activities have the potential to not only decrease, but also increase body satisfaction. These activities may provide feelings of control (Shafran et al., 2004) and relieve anxiety in the short-term (Reas & Grilo, 2004). While we posited that exposure to one's own image through selfies during the selfie-taking process leads to dissatisfaction in this group, it is also possible that producing a 'good' selfie or an image of the self that one is satisfied with could produce a positive outlook on one's appearance. Qualitative work indicated that in healthy women being unable to achieve desirable selfies was associated with negative feelings, while being able to achieve desirable selfies was related to positive feelings (Warfield, 2014). Therefore, in our study, both within and between individuals, there may have been a mix of desirable and undesirable selfies taken. Some selfies may have been deemed 'acceptable' for posting, but not 'perfect'. This may have produced a non-linear relationship that could not be detected using our linear statistical strategy or methodology.

Finally, we would like to comment on a finding that supports our interest in offline selfies in comparison to online selfies. We have posited that offline selfie-taking is a distinct behavior from online posting and thus, chose to look at offline selfies individually in this study. This reasoning is not only supported by the significant mediational relationship found via body checking but also the fact that these two behaviors were not correlated. Therefore, people who posted more selfies online did not also take more offline selfies or vice versa. This is further highlighted by the difference in the frequency of these behaviors; the average number of selfies posted in the last week was 4 compared to 44 offline selfies. This provides evidence for the consideration of selfies that are taken with no intention of posting to social media in future work as well as online selfie behaviors.

The findings of the current study have several practical implications which are drawn with caution. As this is a cross-sectional study we cannot infer a causal relationship between offline selfie-taking, body checking and ED symptom severity. Furthermore, due to the small size of the indirect effect via body checking we do not want to overstate our findings. Nevertheless, there are avenues where these findings could be of importance. Given future investigation, in the general ED population offline selfie-behavior could potentially become a target for ED treatment alongside other body checking behaviors. In particular, selfie-taking for inpatients with an ED may undermine their therapeutic care.

A strong point of the current study is the large sample size. Typically, it is difficult to access larger groups of individuals suffering from clinically severe ED symptoms. Therefore, the sample size increases the statistical power and our confidence in our results. Furthermore, this study is the first to investigate selfie-behavior, particularly offline selfies, in individuals with clinically severe ED symptoms. By addressing this gap in the literature, we are breaking new ground and hope to draw attention to the potential effects of selfie-behavior in this group.

We should also acknowledge some limitations. As previously mentioned, this is a cross-sectional study and thus causality cannot be inferred. Thus, the current design does not allow us to make claims about the directionality of our findings. Additionally, our sample may not be fully representative of ED sufferers in the general population. It is possible that the women that visit the e-community have a higher awareness of their condition due to using the self-help website. Conversely, previous work has found that the average EDE-Q global score for visitors of e-communities is comparable to a clinical sample seen in practice (Aardoom et al., 2016; Aardoom, Dingemans, Slof Op 't Landt, & van Furth, 2012) and the average global EDE-Q in the present study is comparable to this work. Thus, although we cannot generalize to the entire ED population we can generalize to the help-seeking ED population at large. Furthermore, our sample is also likely to reflect a selection bias with regards to who agreed to participate in our study which was advertised as a survey on social media use and body image. This is reflected in almost the entire sample (98%) having a social media account. Many people without SNS accounts or infrequent SNS users may not have participated because they believed they were not eligible. This is not a problem for our investigation into selfie-posting, however, it may have affected our investigation into offline selfies. It is possible that the indirect effect observed for offline selfie-taking may differ if repeated in samples that use SNS less frequently.

Selfie-behavior in EDs, is an under-researched area and so there are many potential directions for future research. As aforementioned, we would like to emphasize that time spent engaged in the steps leading up to posting selfies is important. Also, collective measures of time spent engaged in selfie-behavior both for online and offline purposes would be advantageous. This may provide more accurate representations of exposure to one's own image than frequency of selfie-posting or offline selfie-taking alone. Future research should also consider longitudinal designs to examine the strength of relationships between offline selfie-taking and body checking behaviors using a less SNS selective sampling method. This would provide an indication of causal relationships between offline selfie-taking, body checking, and ED symptoms, which might have the potential to inform future clinical practice. Our findings may be relevant for interventions like the Body Project (Stice & Presnell, 2007) where young women at risk for developing an ED could perhaps be encouraged to engage with their offline selfies in a compassion focused manner rather than for the negative motivations of body checking. This also aligns with the leading principles from the Expand Your Horizon intervention program on body image improvement through focusing more on what one's body can do (i.e., body functionality), rather than only what it looks like (Alleva, Martijn, Van Breukelen, & Karos, 2015).

In conclusion, the relationship between offline selfie-taking, body checking and ED symptoms warrants further investigation. By addressing offline selfies for the first time in a sample of individuals with clinically severe ED symptoms our findings provide a valuable starting point for future examination of how our new selfie culture is affecting women's body image.

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Declarations of interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.chb.2019.07.018.

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